VERNEUIL. (A)

The reciprocal effects of constitutional conditions and injuries.

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THE RECIPROCAL EFFECTS OF CONSTITUTIONAL CONDITIONS AND INJURIES.

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It is yet very difficult to establish in an exact and complete manner the relations existing between constitutional conditions and traumatic lesions, but even now, by the aid of the literature hitherto collected, we have (1) acquired very useful ideas in regard to the diagnosis, prognosis, and treatment of injuries which occur as the results of surgical or accidental wounds, and (2) formulated much more distinctly the indications and contraindications for operation in individuals affected by previously existing constitutional states. If we consider how much has already been done in this direction, despite the short time since these studies have been begun, and the very small number of authors who have investigated them, we may be assured that they will render, before the end of the present century, considerable service to medical science and to the art of surgery. Before entering directly into this question, it will be useful to define what I mean by constitutional diseases, and to indicate their number and their classification.

A constitutional disease, clearly represented by the old expression *morbus totius substantiæ*, and which may be more concisely termed *panpathy;* a constitutional disease, I say, affects at the same time all the organic fluids and solids, altering the latter more than the former, or *vice versa;* modifying by preference this fluid, or affecting this system, rather than others; but at a given moment involving the entire economy. The number of these diseases has been sometimes too much restricted, sometimes too much extended, and a reform must be attempted in this respect. I shall content myself with drawing up a list into which may enter all those which are already known, or which are yet to be recognized.

(1) *Diseases of nutrition*, usually hereditary, but also acquired: arthritism (including gout and rheumatism); undoubtedly cancer; scrofula (including the large majority of cases of tuberculosis).

(2) *Poisons of external origin:* syphilis, malaria, alcoholism, morphinism, saturnism [lead poisoning], glanders, heterochthonous septicæmias; or *of internal origin:* diabetes, leukæmia, autochthonous septicæmias.

(3) *General conditions following sooner or later on a permanent lesion of an important viscus*, such as the lungs, heart, liver, kidneys, brain, spinal cord, etc. Although presenting the fundamental characteristics of constitutional diseases, these conditions have not yet received a special name. It is only

recently that those suffering from them have been called cardiac, hepatic, nephritic subjects, etc. *Old age*, as a permanent general condition characterized by various degenerations of the viscera (steatosis, sclerosis), *pregnancy*, *the puerperal state*, and *acute anæmia*, being temporary extra-physiological conditions, may enter into this category.

On the Reciprocal Influence of Constitutional Conditions and Injuries.

Pre-existing or *propathic* general conditions may exercise an influence upon injuries in various ways:—

Primarily, by favoring the development of certain complications which are situated at the site of injury, or start from it; inflammation, circumscribed or diffuse; lymphangeitis; erysipelas; hemorrhage; neuralgia; alteration of the granular membrane, etc.

Secondarily, by modifying, arresting, and disturbing the reparative process; by destroying what has already been accomplished (ulceration of cicatrices, softening of callus); by replacing an affection of a determinate and calculable duration, the *trauma*, by another affection the length of which we are unable to foresee.

Finally, by fixing themselves upon the point already wounded and become the place of least resistance (*locus minoris resistentiæ*), in order to develop there a more or less obstinate diathetic manifestation.

On the other hand, traumatism may exercise an evident action upon pre-existing constitutional states; it may call them to the wounded spot, awaken or reawaken them, make them pass from a latent to an active condition, and cause their manifestations to appear at the site of injury itself, or in distant regions, if not throughout the entire economy. It usually hastens the course of the diathesis, and more especially aggravates the lesions which that has already produced, and which may have been more or less stationary before the injury.

But this is not true of all cases. The constitutional affection and the injury may at first run parallel to each other, without influencing each other in the least; the subject of the diathesis supports the shock as if he were perfectly healthy, while the wound on the other hand runs a regular and classical course. These fortunate cases are not very rare; we are beginning to be able to foresee them, and we shall undoubtedly soon succeed in increasing their proportion. In the second place, the influence of the trauma upon the constitutional disease is not always unfavorable, but rather the contrary; for the local affection may perhaps be the cause as well as the effect of the general malady, in which event, its suppression exercises the most prompt and decisive action upon the re-establishment of health. It is in this way, for example, that our operations act so effectually against chronic septicæmias. Finally, even when the simple or reciprocal influence of the injury upon the primary disease is exercised in an unfavorable manner, the resulting morbid actions are not always very disastrous.

On the other hand, diatheses only have a limited pathogenic influence; accidental causes, including injury, can only make them produce a certain number of determinate local manifestations, which cannot differ, and in reality do not essentially differ, whether they have been produced by main force, and as it were unseasonably, or whether they have been developed spontaneously in consequence of the natural evolution of the malady.

From a clinical point of view, constitutional diseases present numberless differences: they are active or latent; of recent date or of long standing; of slow or of rapid course; with a constant tendency towards aggravation or

towards recovery; capable of yielding to treatment or of obstinately resisting it; still compatible with a moderate degree of health, or impairing more or less deeply the more important functions; sometimes single, sometimes combined or associated with one another in such a manner as to create hybrid forms, which are very little known despite their extreme frequency and great interest. It is hardly necessary to add that each constitutional disease presents mild and grave, acute and chronic varieties; and that for some of them, syphilis and scrofula for example, stages and periods are properly recognized. All these considerations enable us to understand, *a priori*, that operative and accidental traumata cannot have a uniform action upon dissimilar subjects, and that, on the other hand, different diseases cannot react in the same manner upon the traumatic process.

But observation will show even better that the prognosis of operations varies infinitely in one or another panpathy, because each constitutional disease interferes with the reparative process in its own way, and because the same surgical wound reacts in a peculiar manner upon each particular subject of a diathesis. I do not know how many observations would have to be made, nor how much time devoted to their analysis, before making a generalization and obtaining exact indications for practice; but, in the mean time, I can enunciate certain synthetic remarks which I believe to be already sufficiently firmly established. They are not based on clinical history, but on pathological anatomy.

Without underestimating the large gaps which this important branch of medicine still presents with reference to general diseases (and it is known that this reproach is emphasized by the latest representatives of the purely clinical school), we may nevertheless recognize in these affections three distinct phases: (1) that of *dyscrasia*, usually opening the scene, continuing perhaps permanently, and representing alone the morbid condition; characterized essentially by a change in the fluids, which, unfortunately, we are still far from understanding even with regard to the most frequent diathesis; (2) that of *peripheral lesions*, appeciable to the chemist or pathological anatomist, but slight, or affecting organs of secondary importance; and finally (3) that of *visceral lesions*, with two varieties which must be distinguished according as the organs are affected by a common or general pathological process—phlogosis, sclerosis, cirrhosis, steatosis, amylosis; or are the site of a heteromorphous deposit peculiar to certain general diseases—tubercles, gummata, lithiasis, various neoplasms.

The following is the result of experience derived from a large number of cases taken from my own practice or that of others: in the purely *dyscrasic period*, the patients tolerate operations almost as well as healthy subjects; the manifestations of constitutional disease, when they make their appearance, are usually of little gravity and but temporary; and, if the changes of the fluids are still slight, the reparative process proceeds with sufficient regularity. During the period of *peripheral lesions*, the reaction of the trauma may be more grave, because it finds, in the more or less seriously affected tissues, systems or organs, places of least resistance, thoroughly prepared for fresh diathetic manifestations or an aggravation of the pre-existing disorders. Anomalies in the local process are to be so much the more dreaded, as the concomitant dyscrasia is the more pronounced. During the period of *visceral lesions*, the dangers are greatly increased, because the morbid process is peculiarly complicated. In the first place, the sites (*loci*) of least resistance being situated in organs essential to life, the reaction of the traumatism upon them gives rise to, or aggravates, affections regarded as serious at all times and in every case, and in which there is great danger to life. The dyscrasia too, in its turn, reaches its height, fostered as it is by two causes: (1) the humoral

changes due to the constitutional disease, and (2) that other adulteration of the fluids which inevitably results from imperfect or perverted function of an important viscus; hence conditions which are extremely unfavorable for the progress of the trauma towards recovery. I believe also that I can point out a third source of danger which has, I think, hitherto passed unnoticed. The injured region, it is commonly believed, is capable of developing an organic poison, the entrance of which into the economy produces a true intoxication, viz., traumatic septicæmia. The latter is of variable intensity, according to the quality or quantity of the poison, its accumulation or elimination. Under ordinary conditions and in healthy subjects, the large viscera serve as emunctories for this poison as for so many others. But if this vent be closed on account of a profound lesion of the glandular parenchymata, elimination is rendered impossible, and those acute septicæmias are found to be developed which so rapidly lead to death.

All these propositions would gain in clearness by being sufficiently developed or illustrated by examples, and I greatly fear that they will not be understood in the concise shape under which I present them; but I am limited as to space, and cannot dilate further upon this part of the subject.

The conduct of the surgeon follows naturally from what has gone before. Since the subjects of diatheses cannot be deprived of the benefits of surgical interference, even though this be particularly dangerous to them, the surgeon should strive to lessen the gravity of the prognosis, and to insure at least operative success, that is, the immediate result of his operation. In cases in which he cannot do this, he had better abstain, unless indeed he does not seek the cure of the disease, and is content with merely checking its progress. Fortunately, he will often succeed in averting the accidents which arise from the constitutional condition, by the aid of a series of readily executed measures.

In the first place, he will carefully choose his *time*. If this is impracticable in urgent cases, the rule of *occasio præceps* is, on the contrary, easily followed when, life not being immediately threatened, we can hasten or delay the time of action. As regards the majority of morbid states, we should operate quickly, during the dyscrasic period, before the onset of the histological, and especially of the visceral lesions. In the two chief constitutional diseases, arthritism and scrofula, the latent period is preferable to that in which fresh manifestations occur. We may allow certain diatheses, like syphilis, to wear themselves out; but, on the other hand, we should attack at the onset those neoplasms which are still local, and the extension and generalization of which are imminent.

Great care should be taken with regard to the *operative procedure*. We must be very sparing of blood in exhausted or poisoned subjects; must save neuropathic individuals as much pain as possible; and must prevent, as much as we can, traumatic fever in those whose viscera are affected. An exceptional and little used method may become the plan of election in a particular instance. Diabetic phlegmons and carbuncles should be incised by the thermo-cautery and hot iron, not with the bistoury. Methods of slow and progressive division would, on the contrary, be injurious in irritable subjects, whom pain exhausts and irritates.

The choice of a *dressing* also merits special attention. I may remark, in the first place, that diathetic patients, like all others, owe thanks to the antiseptic method. Whenever possible, the judicious employment of various forms of this method: the wadding dressing of Alphonse Guérin, Lister's dressing, the open antiseptic dressing, etc., counterbalance to a considerable extent the unfavorable influences of constitutional diseases. Under the wadding bandage, I have seen alcoholics and diabetics recover, who would almost undoubtedly have succumbed ten years ago with the old-fashioned dressings. I

have obtained wonderful results with the permanent antiseptic bath and with open dressings. Lister and his disciples daily perform similar miracles which throw into relief the great part played by the traumatic centre in the production of complications. We must not, however, run into extremes; and in considering how very favorable is the suppression of traumatic fever in diathetic individuals, we must not imagine that all danger ceases from merely treating the wounds antiseptically. If this were so, the influence of constitutional conditions would be entirely neutralized to-day, and these pages would be unnecessary.

I know not whether in the future affairs will run such a course that we need not fear the deterioration of the economy by antecedent diseases, but unfortunately we have not arrived at that stage at present. With the antiseptic method we lose indeed fewer, many fewer patients; but we still lose some, and a careful examination of the causes of death clearly shows us that they consist almost exclusively in bad constitutional conditions of the injured persons. We may add, moreover, that antiseptic dressings, in order to be really efficacious, should be applied rigorously, and that such applications cannot always be effected in the actual condition of science. In order to prove this, it is only necessary to refer to the extensive class of *operations in cavities*, that we may remind the surgeon that, under many circumstances, he must still combat the evil influence of general disease.

But the point which must be insisted on most strongly, is the necessity of instituting during, after, and especially before the operation, if there be no urgency, a plan of treatment in which are associated hygiene, diet, the use of drugs—medical treatment *par excellence*—designed to combat the constitutional disease, as would be done were no surgical complication present. Not only, by such a plan, will the chances of the immediate success of the operation be increased, but we will often have the good fortune of indefinitely delaying the injurious relapses of the diathesis. It may even happen that, while merely attempting a preparation which shall be favorable to the final result, there may be obtained, by medical treatment alone, a recovery as brilliant and much less onerous than that which was expected from the knife.

After these general considerations upon the reciprocal influence of constitutional diseases and traumatic lesions, we will now begin the study of the relations of each panpathy to wounds.

ARTHRITISM.

(*Rheumatism*, *Gout*, *Herpetism*.)

RHEUMATISM.—(1) *Influence of Rheumatism upon the Seat of Injury.*—The rheumatic diathesis has not, like syphilis and scrofula, the property of impressing a peculiar stamp upon the traumatic lesion; it does not even modify to an appreciable extent the reparative process as do alcoholism and diabetes. Neither favoring the production of pus, nor counting among its morbid processes either ulceration, gangrene, or diffuse inflammation, it has hardly any tendency to modify surgical wounds unfavorably, to increase or alter the suppuration, to prevent the formation and transformation of the granular membrane. Open wounds, therefore, have commonly a good appearance in rheumatic patients, and run their course in the usual manner. Certain specific complications may, however, occur at the wounded point, which are observed not unfrequently and are easily recognized. It is known that even a slight articular lesion in a rheumatic patient readily gives rise to a hydrarthrosis, a more or less obstinate synovitis, or even loose bodies; and that a luxation, a

sprain, a penetrating or even epiphyseal fracture, may prematurely give rise to the characteristic lesions of dry arthritis, and sometimes even to true or false anchylosis. The rheumatic diathesis, in the various places in which its spontaneous manifestations arise, very readily and rapidly causes serous effusions, œdema, plastic exudations, temporary or permanent (under the form of various neoplasms—fibroma, cancer, etc.), simple or hemorrhagic congestions, all accompanied by severe pains, fixed or wandering, temporary, intermittent, remittent or continuous, assuming the form of local hyperæsthesia or irradiated neuralgia; and, on carefully watching an injured rheumatic, it is easy to recognize at the seat of injury, or in its immediate neighborhood, an entire series of anatomical lesions of functional disorders, having the greatest resemblance with those which have been mentioned—lesions and disorders which, to my mind, constitute the arthritic complications of wounds. Among these, for example, I include serous effusions in cavities or connective tissue, marked cellular proliferation, pseudo-phlegmons, active hemorrhages, erythema and other severe eruptions in the neighborhood of the wound, neuralgia, and, at a later period, neoplasms and certain affections of the cicatrix.

(2) *Influence of Injuries upon Rheumatism.*—It would be undoubtedly proper to distinguish cases according as the injury occurred before, during, or after the rheumatic attack; but the facts are wanting for the carrying out of this programme. There are scarcely any observations on record of wounds contracted during an attack of articular rheumatism; those of wounds prior to the first rheumatic manifestations, and which produce the unexpected and premature appearance of the diathesis, are equally rare. Nothing is more common, on the contrary, than the renewal of rheumatic symptoms of older or more recent date. This fact, equally well known to the physician and surgeon, has been recognized in a summary manner for a long time. The wounds which may excite the diathesis are extremely varied; strains, fractures, slight or serious contusions, the most varied surgical operations, the removal of tumors, incision of fistulæ, lithotomy and lithotrity, etc. In their turn, the manifestations of the diathesis thus reawakened, are no less variable; sometimes the entire economy is disturbed by a fresh attack of acute, generalized rheumatism, sometimes there is only a local affection, striking a part which had been previously involved, without this predisposing condition being however necessary. We find recorded cases of acute or chronic arthritis, certain cutaneous eruptions (herpes among others), neuralgic pains, muscular spasms, contractions, pericarditis, cystitis, pulmonary congestion, hepatic or nephritic colic, changes in the urine, profuse sweats, etc.

Chronic rheumatism affecting important organs, such as the heart, lungs, kidneys, and walls of vessels, may at length affect their structure more or less profoundly, and convert them into weak points which will feel the effects of the traumatism. But the complications which then arise have only distant relations with rheumatism, and may be more conveniently studied when we come to the special consideration of the constitutional conditions developed by affections of the great viscera.

Gout.—Like rheumatism, gout generally respects the reparative process, and usually does not interfere with the cicatrization of wounds. Nevertheless it is sometimes manifested at the site of injury by fluxions with acute pains, which are capable of simulating frank inflammation, but which are only congestions, usually of a temporary character. The pain also occurs without any apparent lesion, and under the form of neuralgia. In these cases, indeed, the curative process is temporarily suspended or at least retarded. At a later period, chalk stones may appear around wounded joints, and in cases of fracture exuberant callus has been observed. Repeated slight injuries

in the gouty may probably have for their effect the development of certain neoplasms, especially epithelioma. Subcutaneous lesions and sprains are more liable to be followed by manifestations of the diathesis than open wounds.

The traumatism in its turn, has an effect upon the disease. There is hardly any example known of an injury contracted during an attack of gout, or which has excited the first attack of a previously latent gout. In the cases observed, the injury occurred in the interval between two attacks, in a gouty patient who had previously suffered more or less often. As a rule, the attacks thus provoked by main force develop quickly (from the first to the fourth day for example), are of but moderate intensity and brief duration, and appear to be excited preferably by slight injuries. I have, for instance, twice seen gout follow puncture of a hydrocele with a very fine trocar. In one case in which an injection of iodine had been made, the attack appeared to act as a derivative, for the inflammation of the tunica vaginalis was to a great extent wanting, causing extreme slowness of recovery. In cases of chronic gout or gouty cachexia in gouty subjects affected with renal or hepatic lesions, the prognosis is rendered grave. More or less serious complications may invade the seat of traumatism, but must be especially attributed to the visceral changes, rather than to the gouty dyscrasia.

Herpetism.—I give this condition a place here, although I do not consider it either a distinct diathesis, or a separate constitutional disease. To my mind herpetics are simply arthritic subjects in whom the predominant manifestations are on the part of the mucous membrane and the skin. Herpetism then acts upon injuries only after the manner of rheumatism, and especially of gout, by producing at the site of the injury early or late neuralgias, either intermittent, remittent, or continuous; and, in the integument near the seat of traumatism, congestions, fluxions, and, finally, various cutaneous affections, among which herpes occupies the first rank, as shown by the numerous observations of traumatic herpes which have already been recorded. Traumatism is undoubtedly a determining cause of herpetic manifestations; it produces cutaneous eruptions at places in which they have never appeared before, brings back with the greatest facility those which have disappeared, and prolongs the existence of those which are already present in the wounded region. Wounds, properly speaking, act much more effectually in this respect than deep-seated injuries, whether or not involving the great cavities.

Cancer.

Surgical operations are so frequent in cancerous individuals, that it is natural to inquire whether or not cancer influences injuries, and in the event of an affirmative answer, what changes it produces in the reparative process. Now it must be remembered in the first place that cancer, in spite of what has been said on the subject, is not a distinct constitutional disease; that it is included in a much more extensive diathesis, the neoplastic diathesis, or the tendency to produce neoplasms spontaneously, or under the action of a determining cause; that the neoplastic diathesis itself is strictly dependent upon arthritism—which is equivalent to saying that neoplastic and cancerous subjects are merely arthritic patients suffering from a special manifestation of the constitutional disease. We might therefore simply refer to the preceding paragraphs; but a few special remarks will perhaps not be useless.

Cancerous subjects belong to various categories. In some, the disease is latent, in a condition of predisposition; in others, it already exists in well-defined manifestations. Some present only a single tumor, others have seve-

ral cancerous deposits scattered over various parts of the body; sometimes the morbid masses are situated in the external parts, the limbs or walls of the splanchnic cavities, sometimes they occupy the viscera or deep parenchymata; often they are observed both externally and internally. Finally, certain cancerous patients present no other lesions than the single or multiple tumors with which they are affected, while in others we find humoral changes, or more or less serious disorders in organs which are free from all neoplastic deposits. In certain predisposed subjects, injuries, and almost exclusively contusions, appear to invite the manifestations of the disease. Before complete recovery, or a longer or shorter time after apparent recovery, the centre of traumatism is invaded by the neoplasm, and the cancer appears at the seat of injury.

Cancerous patients who are affected by single tumors situated in organs not essential to life, and whose viscera are healthy, tolerate injuries well; the reparative process pursues a normal course. The only complications to be feared are those which are observed in arthritics, and which usually present but slight gravity; such are traumatic herpes, early secondary neuralgias, recurrent attacks of rheumatism or gouty paroxysms, etc. I know of no authentic example of an open wound in a cancerous subject, in a region exempt from cancer, which has itself undergone the cancerous metamorphosis. In cases of removal of tumors, when the ablation has been early and free, the cicatrices are healthy, firm, and usually not liable to relapses, which readily occur, on the other hand, in distant localities.

Cancerous patients affected by multiple deposits, and especially by visceral tumors, tolerate accidental wounds and surgical operations very badly. A large proportion succumb in consequence of even slight injuries, such as simple fractures, the removal of small tumors, palliative operations, tracheotomy, formation of artificial anus, etc. The seat of injury may become the site of the ordinary complications of wounds: inflammation, hemorrhage, erysipelas, pyæmia, etc., but more frequently still we notice merely an almost entire absence of the reparative process; immediate union, cleansing of the wound, formation of the granular membrane—all are wanting. At the same time, there are high fever and profound adynamia; and death often occurs very rapidly without its being possible to ascribe it to any of the recognized complications of wounds. The same termination is usual in cachectic cancerous patients, in whom the large viscera (liver, kidneys, heart) are affected by fatty degeneration. The complications which cause the fatal result are always better characterized in them, and we find the classical causes of operative failure, diffuse inflammation, severe erysipelas, septicæmia, pyæmia, secondary hemorrhage, etc.

Such a case as the following, which is unfortunately very common, cannot be explained with our present knowledge. An operation is performed upon a readily accessible, external tumor, in a cancerous subject who is apparently free from all internal lesions, and who presents the appearances of satisfactory health. The wound does not advance towards recovery, general symptoms appear, death occurs with or without local complications, and nothing is found at the autopsy except a few, small, cancerous nodules scattered through the lungs, liver, or other viscera, and the existence of which had not been suspected. Though the traumatism may produce the premature appearance of cancer by making the injured part the port of entry and place of election, it reacts even more frequently upon pre-existing cancerous tumors. It usually accelerates their course, and causes an active increase of the proliferation. This is especially observed in cases of wounds of the tumor itself, such as contusions, exploratory punctures, incomplete operations, etc. But this irritating action is exercised equally at a distance. Many times we find that small,

indolent, stationary glands, which it was not thought necessary to remove when operating upon the principal tumor, rapidly attain a considerable size, soften, and ulcerate. Before performing castration, the iliac and perineal regions may have been examined with the greatest care, and nothing suspicious have been discovered; but the cicatrization of the scrotal wound is scarcely effected before the patient complains of lumbar and abdominal pains, and palpation discloses, deep in the abdomen, tumors which grow with extreme rapidity.

Injuries not due to operations have the same stimulating power; those which are least severe, such as simple fractures or contusions of the limbs (very remote, therefore, from visceral cancers), may aggravate the latter to such a degree as to produce an entirely unexpected death within a few days. In some exceptional cases, the injury, especially if it is of an operative nature, appears to cause a temporary revulsion and to arrest the general progress of the disease. This respite is usually temporary; the wound has scarcely cicatrized before the cancerous deposits assume or resume their destructive course. Surgical operations for cancer, when accompanied by profuse loss of blood, or followed by profuse or prolonged suppuration, manifestly hasten the progress of the cachexia.

SCROFULA.

Bearing in mind the morbid processes habitually met with in the scrofulous: inflammation, not severe but obstinate, of slow course, and often chronic from the beginning; abundant connective-tissue proliferation, readily set up by local irritation, but remaining stationary and able neither to disappear nor to complete its organization; suppuration without inflammatory reaction of the surrounding parts, often profuse and kept with difficulty within bounds; indolent, atonic, interminable ulcers, which return on the slightest occasions, etc.—we can readily understand what modifications this constitutional disease can produce on the various acts of the reparative process.

At first, this process appears to progress as well as could be wished; the traumatic irritation and local inflammation are moderate, circumscribed, without tendency to diffusion, accompanied by scarcely any pain; immediate union is often attained, and, in cases of open wounds, the granular membrane is rapidly formed. After this first effort, however, everything seems to have come to a stop; the suppuration becomes thin and serous; the granulations grow pale, swell up, and soften; the edges of the ulcer, which have approached one another, separate, gape open, and grow thin; the wound is replaced by an ulceration which, after a short period, differs but little from a scrofulous ulcer that has developed spontaneously. In case of interstitial injury, the connective-tissue proliferation appears under the form of diffuse swelling, fungous growths of the synovial membranes, and thickening of the periosteum; suppuration commonly occurs in this centre of induration, in which, without doubt, tubercles are sometimes developed. These abscesses are followed by inevitable and interminable fistulæ, with blind pouches, suppurating tracts, and separations of tissue, whence stagnation and alteration of pus, almost inevitably giving rise to chronic septicæmia and its consequences, especially if various parts of the skeleton are involved. Recovery, however, sometimes occurs after a longer or shorter period, but it is not rare to find a relapse of the local complications, either on account of fresh violence, even slight, affecting the parts formerly injured; or under the influence of an intercurrent disease; or from the progress of the scrofula as regards the viscera; or, finally, from the onset of tuberculosis. There is nothing

more common in such cases than the relapse of osteitis or arthritis, the return of abscesses, reopening of fistulæ, etc.

Scrofula has so great an influence on the reparative process that it impresses its seal even upon the cutaneous cicatrices, which remain indelible and perfectly characteristic throughout life. On the other hand, scrofula possesses to such a high degree the vexatious power of indefinitely prolonging traumatic lesions, that it must always be looked for, even in individuals of very healthy appearance, whenever recovery from a wound is much delayed.

Wounds inflicted by the surgeon act in precisely the same manner as accidental injuries. Their early phases are almost exempt from dangers, and very rarely attended by wound-complications, such as phlegmon, gangrene, hemorrhage, pyæmia, etc. The lymphangeitis and erysipelas which sometimes start from them are transient, and without violent reaction. Accordingly, every one declares the mildness of operations in the scrofulous. This opinion should, however, be combated, or at least modified. It is true that rapid death is exceptional, but complete and permanent recovery is not much more common. If we trace the results of operations on scrofulous subjects with sufficient perseverance, we will notice the extreme frequency of half-successes, of incomplete results, of unfinished cures, of relapses at an earlier or later period; so that it is exceptional to find a scrofulous patient upon whom resection or amputation has been performed, who is sound and healthy ten years after the operation.

Traumatism possesses to a high degree the power of awakening, reawakening, and aggravating scrofula, whether latent or already declared. In slight cases, it causes from time to time the first manifestation, in children of fine appearance, of the superficial and slight symptoms of the diathesis: rashes; cutaneous eruptions, impetiginous or otherwise; subacute or indolent adenopathies. More frequently still it stimulates extinct or languishing centres of disease, and restores to local affections their original severity. Cures which were believed to be radical, or, at least, near at hand, are thus again rendered doubtful. Finally, when there are visceral lesions derived directly from scrofula, such as tubercle of the lungs, intestines, mesentery, or nervous centres; or which are but consequent upon prolonged suppuration and chronic septicæmia, such as fatty and waxy degenerations of the liver, kidneys, spleen, and intestines; the injury almost always proves fatal by the more or less sudden aggravation of affections which no doubt rendered life precarious, but which nevertheless, except for the traumatic shock, would have permitted the patient to live for some months, or perhaps even for some years, longer.

At this stage of scrofula, the subjects of wounds or operations may undoubtedly succumb to local complications, but much more frequently die of marasmus and exhaustion—that is to say, of phthisis, albuminuria, anasarca, uncontrollable diarrhœa and inanition—or of cerebral complications.

Tuberculosis.

If pulmonary tuberculosis may, without hereditary antecedents or evident predisposition, appear in the last stages of almost all constitutional diseases, such as arthritism, syphilis, diabetes, alcoholism, etc., and even of affections which have only involved the digestive functions, such as simple stricture or carcinoma of the œsophagus or rectum, epithelioma of the tongue, etc., it is none the less true that, in the immense majority of cases, tuberculosis is an appendant of scrofula, or that, in other words, tuberculous subjects are merely scrofulous subjects of a certain variety.

The statements made in the preceding paragraph might therefore be applied

to the reciprocal relations of tuberculosis and traumatism. It must be remarked, however, that as the mere presence of tubercles in any organ whatever indicates at once a serious condition of the economy—a dangerous form of scrofula—we must expect to find the reparative process hindered, and recovery retarded or indefinitely delayed, in wounded persons who are tuberculous. This fact has been amply demonstrated. The observations are numerous in which amputations, in tuberculous patients, have been followed by acute atrophy of the flaps, by inflammation, by conicity of the stump, etc. This influence of tuberculosis upon the course and termination of operations has been known for a long time; for we find the question discussed in old books whether it is wise or not to amputate in phthisical cases, or even to operate upon simple anal fistulæ. The advocates of abstention find no difficulty in making evident, in the large majority of cases, not only the dangers but also the uselessness of surgical procedures which merely substitute for one chronic lesion another almost identical in character. Other authors, indeed, furnish facts which are favorable to intervention. The affirmative and negative conclusions of our predecessors are much too general, and do not reflect sufficiently the extreme diversity of cases presented in practice. In fact, the unfavorable chances are singularly increased or diminished according as the tubercles are deep or superficial; abundant, generalized and large, or rare, discrete and small; as they are in course of genesis or rapid evolution, or stationary and in course of fatty or calcareous degeneration; or, finally, as they have more or less disorganized the organ which they occupy.

Writers, again, have had too exclusively in view pulmonary tuberculosis, and have left out of sight tuberculization of the brain, mesentery, genital organs, bones, glands, etc. Even in respect to pulmonary phthisis itself, in considering the indications and contra-indications for operation, the surgeon should have regard to its extent, its degree, its forms, its origin, and its causes.

Finally, we must not accept or reject indiscriminately all operations, but consider each one separately. Thus, if resections must be avoided in tuberculous individuals, we may sometimes, if only for the purpose of prolonging life and rendering it more comfortable, perform amputation, and, generally speaking, may employ the whole series of urgent, and a certain number of palliative operations.

Scurvy.

Essentially characterized by a change in the blood, by friability of the vascular walls, and by fatty degeneration of the tissues and especially of the liver, scurvy offers all the conditions necessary for the production of various complications at the seat of injury. The most important is naturally *hemorrhage*, so easily provoked by the least violence exercised upon the vessels and tissues, that it is almost always of traumatic origin, even when appearing to be spontaneous. The discharge of blood occurs at all parts: externally, into the cavities, into the interstices of the tissues; and gives rise not only to hemorrhage properly so called, but to all the possible varieties of blood-extravasation—extensive ecchymoses, suffusions, infiltrations, effusions, blood-tumors, etc. To this first cause of delay in the local reparative process, must be added the more or less complete *absence of the neoplastic function;* definitive histological regenerations are especially defective. Hence atonic, obstinate ulcerations of bad appearance; interminable suppuration; delay in the consolidation of fractures; or production of permanent pseudarthrosis. The callus already formed may soften a longer or shorter time after the fracture; cases are even cited in which callus, that had been solid for several years, softened in consequence of an attack of scurvy.

Nothing justifies the belief that injury may produce scurvy. Cases have been reported in which a wound, occurring in a subject of healthy appearance, assumed a scorbutic aspect, after which the other symptoms of the disease soon showed themselves; but this can be explained as well by saying that, at the period of injury, the scurvy did not exist, and that it was developed as an intercurrent disease; or that it was yet latent and ill-defined, and that, after the manner of other diatheses, it first showed itself at the seat of injury as at the place of least resistance. In confirmed scorbutics, wounds sensibly aggravate the general condition, and contribute to the decay of the organism, by primary or secondary loss of blood, and by prolonged suppuration.

Leucocythæmia.

The number of cases hitherto collected is still very small, but is already sufficient to prove the disastrous influence exercised by leucocythæmia upon accidental or operative wounds. The most frequently observed complication, at the site of injury, is rapid or slow *hemorrhage*, which is almost always uncontrollable, and almost inevitably leads to death. This hemorrhage does not appear after capital operations only, but follows also insignificant wounds, such as biting the tongue, paracentesis abdominis, the application of leeches, lancing the gums, etc. The few patients operated upon who do not perish from loss of blood, die of phlegmon, phlebitis, pyæmia, or peritonitis, especially after splenotomy—an operation, which has now been practised at least fifteen times upon leucocythæmic patients, and which has, under these circumstances, always been followed by death.

Certain more or less conclusive observations lead to the belief that injuries may by themselves engender leucocythæmia. Splenic contusions have been cited in the first place—cases in which the hypothesis is acceptable; then a fracture of the thigh, a sprain, the extirpation of tonsils in a state of chronic inflammation; in a word, injuries not primarily affecting the spleen. With regard to the latter cases, at least, it appears more probable that the leucocythæmia pre-existed, but in a mild and latent condition, and that the injury aggravated and rendered it evident. This stimulating action is moreover demonstrated by a case in which a wound of the leg gave rise to peritonitis starting from the diseased spleen. Injuries sometimes shake the organism of leucocythæmic patients to such a degree that they immediately sink into a rapidly fatal collapse.

Hæmophilia.

It would certainly be surprising not to find in the list of constitutional conditions bearing a relation to traumatism, this condition, peculiar to certain individuals, in whom the blood tends to escape by every channel, and in whom there is no tendency to the production of spontaneous hæmostasis.

However, before recalling what is contained in the books, I experience a certain embarrassment, because, in my tolerably large experience, I have never seen a case of hæmophilia; because the subjects in whom I have myself observed this tendency to bleed, and this difficulty of hæmostasis, have been merely patients suffering from hepatic disease, malaria, diabetes, scurvy, leucocythæmia, etc.; because among the published observations the majority are very incomplete from a clinical point of view as well as in reference to pathological anatomy; because, moreover, these observations become more and more rare in proportion as we become better acquainted with diathetic hemorrhages; because, to express my meaning in one word, I am in no

degree convinced that there is such a special condition, deserving a special place in nosology and a special name, and because, if hæmophilia really has an existence, I shall wait for it to be a little better demonstrated.

Syphilis.

During its always prolonged, if not indefinite, duration, syphilis may show itself or disappear several times, or be, in other words, alternately manifest or latent. The first condition is common in the beginning of the disease, during the first two or three years or even later, when treatment has been wanting or imperfect. In the opposite condition, the syphilitic may enjoy excellent health for a long term of years without any apparent symptoms. Syphilis may, therefore, be recent or old, evident or masked, when the injury occurs. In the immense majority of cases, the wound progresses naturally without appearing to be influenced by the constitutional disease, but the reverse sometimes occurs, so that the work of repair is more or less interfered with. It will not be useless, in order that the modifications undergone may be appreciated, to recall the circumstance that the pathological processes of syphilis strongly resemble those of scrofula. In fact, we find here the same proliferation and connective-tissue new formation—abundant, but useless, superfluous, even hurtful, as the new tissue strangles the old and finally replaces it by fibrous or cicatricial products. We also observe the tendency to obstinate ulceration and indefinitely delayed repair. It is to be remarked that the two constitutional diseases attack the same systems: the external or internal tegument, osseous system, lymphatic system, etc.; and that, finally, in their last stages or their grave forms, they generate products which are to a certain extent special and closely related, the tubercle on the one hand and the gumma on the other. We should, however, remember to the credit of syphilis, the much more pronounced tendency of its local manifestations to disappear spontaneously, or to yield to treatment, though ready to return on the slightest occasion, under the same form, or even under a different aspect.

These facts enable us to understand what sometimes occurs at the seat of injury: in cases of fracture—delay or complete absence of consolidation, the repair being restricted to the formation of fibrous callus which does not undergo ossification; in cases of simple contusion of bone—osteitis, periostitis, exostosis, periostosis, suppurating gummata, subperiosteal abscesses, osseous denudations, necroses which are interminable on account of the non-formation of natural sequestra. A contusion, even if confined to the soft parts, sometimes gives rise to indolent phlegmons which pursue a chronic course, with scarcely any suppuration, and which leave behind them either fistulæ, or indurations, or ulcerating wounds. If the contusion be severe and circumscribed, the skin may become gangrenous, and, upon the separation of the eschar, we find a wound which possesses all the characteristics of an ulcerating syphilide or gumma.

Wounds made by cutting instruments may also suffer the influence of the diathesis, although this is of rarer occurrence. A failure of immediate union has in the first place been noticed, and, as a consequence, an unsuccessful result of autoplasties; then again there may be early or late modifications in the course of the cicatrization. Sometimes the wound assumes the appearance of an ulcerating or perhaps even of a serpiginous syphilide; sometimes it ulcerates without assuming a specific appearance, and does not heal; finally, it may retain the appearances of an ordinary wound, but persist indefinitely, or it may cicatrize after a certain time only to break open again in a short

period. As for the rest, there is complete uncertainty as to the period at which the diathesis will disturb the curative process. This disturbance, in fact, may occur immediately after the injury, a few days afterwards, or even some weeks or months subsequently. It is common to find that the wound at first follows a normal course, then remains stationary, and finally assumes a syphilitic aspect.

Syphilis seldom attacks wounds during the first months of its existence; it affects them more readily when it is of older date; when it has, as it were, impregnated the economy more intimately. However, we can formulate no distinct rule in this respect, since, in a very large number of cases, wounds have been found to undergo the specific metamorphosis in patients who have been free from all syphilitic manifestations for ten, fifteen, or twenty years, or even longer. The chances of the occurrence of this metamorphosis appear moreover to be the greatest when the injury affects tissues already changed, even though from other than syphilitic causes. Furthermore, other examples equally prove the predilection with which syphilis takes hold of places of least resistance which have become such a longer or shorter period before its invasion. Thus it has more than once been found to select as the site of its local manifestations some old seat of traumatism which had become entirely extinct, and the cure of which would otherwise have remained permanent.

If the quality of the wounded tissues establishes an evident predisposition; if the quality of the poison is also probably a factor in the determination of the mild, moderate, or grave forms of the disease; surely we are permitted to believe *a priori* that the character of the constitution, that is to say the anterior constitutional condition of the wounded syphilitic, will react upon the injury, aid in modifying its course and termination, and recall, in certain cases, the diathetic manifestation. But we must remember that, however probable this may be, it has not been demonstrated. In syphilitics who are in a condition of cachexia, or who suffer from grave visceral lesions of the liver, lungs, kidneys, or nerve-centres, the reparative process goes on no better than in other subjects whose health is ruined, and may be complicated by disorders common to all cachexiæ, such as gangrene, hemorrhage, diffuse inflammations, etc. In these disorders, the part played by syphilis, properly speaking, is relatively small, or at least very indirect.

Let us now speak of the reciprocal action. It is absent much more frequently than it is present; we will here consider only those cases in which it is manifest.

Of course, an injury cannot produce syphilis; but it may introduce it into the economy, attract it to the wounded point, aggravate it, and make it pass from the latent to the active stage. In the immense majority of cases, the infection is produced through the medium of an injury, though very slight and almost microscopical. We have already said that old wounds are sometimes attacked by syphilitic complications in preference to healthy tissues, but the most common cases are those in which the injury affects syphilitics who have been infected for a longer or shorter period. At this point two facts appear: either evident syphilitic manifestations are present, or the disease is entirely latent. In the first event, the lesions receive a more or less active impetus, and become more or less grave; in the second, they appear to originate full-blown, and to attack organs or regions which had previously escaped. They occur under the form of secondary or tertiary complications, according to the stage to which the intoxication has advanced in the wounded subject. The tertiary stage predominates when the syphilis dates back some years, even when it has never produced any secondary symptoms. These complications appear at the point of injury in the centre of traumatism, or in its neighborhood: they are local manifestations excited by the

trauma; or at a distance, but in a single organ or in a circumscribed region; or finally in several parts of the economy at once, as if there was a recent infection which had become generalized.

The diathetic manifestations thus forcibly provoked by the stimulating action of an injury, are a valuable means of diagnosis, revealing the existence of a syphilitic taint of which the patients themselves are ignorant, or which they believe to have been long since extinct. They usually present no exceptional gravity, and yield quite readily to well directed treatment.

Malaria.

Of all constitutional conditions, malaria is perhaps that which reacts most upon the centre of traumatism, and which reciprocally experiences most frequently the counter-stroke of the injury. Accordingly, in countries in which malarial poisoning is endemic, it is expected that the reparative process should be constantly disturbed by various complications, while wounds, on the other hand, excite or renew attacks of intermittent fever. In our temperate climate, and in large cities, these facts, though of rarer occurrence, are nevertheless met with. Malaria may give rise, at the site of injury, to various complications, such as hemorrhage, neuralgia, erysipelas, spasms, and even tetanus; complications which assume an intermittent type, and which yield to the employment of sulphate of quinia. But the influence of the poison is not always shown by periodical disturbances. We find in fact that certain wounds assume a bad appearance, or at least remain stationary, until, the cause being suspected, preparations of quinine, which act like a charm, are administered. It is especially in cases of malarial cachexia that are observed that slowness and insufficiency of repair which terminate in serious diffuse inflammations, or even in gangrene, and which are not always subdued by antiperiodic remedies.

The injury may occur under the following various circumstances: (1) In a patient actually affected by intermittent fever. In this case the wound, especially if it is followed by hemorrhage, rapidly and markedly aggravates the disease. (2) In a patient who has previously been subject to intermittent fever, but who appears to have entirely recovered. The injury, even when of slight importance, such as a contusion, subcutaneous fracture, puncture, slight wound or operation, and although the recovery from the fever may have occurred many years previously (five, ten, or fifteen years, and even more), reawakens the latter or itself experiences its influence, which shows itself under the form of local intermittent complications. It may even happen that these complications (hemorrhage, neuralgia, spasm), instead of choosing a site at the wounded point, appear in a totally different region of the body, not affected by the traumatism, and thus clearly indicate the return of the disease. (3) In a patient who has never had intermittent fever, and who lives in a healthy country, but who formerly resided in a malarial district. The wound, in such cases, may apparently give rise to intermittent fever or to intermittent complications. It is very clear that the injury, not being able of itself to produce a true intoxication, has merely provoked the explosion of a hitherto latent disease, and forced it to reveal itself by pathognomonic manifestations. These latter cases are not very rare, and are especially observed in large cities and in the healthiest regions. They must not be confounded with other cases in which intermittence is also evident, but which bear no relation to malaria. It appears astonishing at first sight that a disease, which is generally so well characterized and so readily recognized, can remain so long and so completely latent. We will be less surprised if we

recall the fact that the fever is not the sole indication of the malarial poisoning, and that, without having had a single attack in an infected district, the system may nevertheless be impregnated by the disease. Malarial anæmia and concealed neuralgias characterize malaria almost as well as tertian or quartan fever.

Moreover, care must be taken, in whatever district it may be, not to confuse the fever which has been aroused with those quite numerous cases in which periodicity is present without the slightest relation to malarial infection. I will mention, among others, those curious cases of wounds of the spleen which give rise to traumatic splenitis, accompanied by distinctly periodical febrile seizures, and readily amenable to treatment by quinine; as also those equally periodical seizures, which are equally curable by sulphate of quinia, and which are due to affections of the urinary passages, in men suffering from disease of the kidneys.

Alcoholism.

Acute and chronic intoxication must be studied separately. Simple drunkenness modifies certain primary phenomena of wounds, viz., pain and muscular contraction; it may obscure the diagnosis, especially in traumatic lesions of the head and spine; it sometimes renders difficult the treatment of certain surgical affections, by interfering with the application of instruments and dressings; at other times, on the contrary, by causing muscular relaxation, it facilitates the reduction of luxations. Casual drunkenness has generally no marked action upon the course of a wound, and does not prevent the performance of certain urgent operations, such as tracheotomy, catheterization, the arrest of hemorrhage, etc. It constitutes, however, a contra-indication to the employment of anæsthetics. Resort was had to it, in former times, as a therapeutic agent in various surgical affections, such as luxations, tetanus, septicæmia, etc.; but the employment of other anæsthetics is far preferable if we wish to obtain muscular relaxation; and if we desire to use alcohol as an antiseptic, it is useless to push it so far as to cause intoxication. Traumatism sometimes modifies the phenomena of drunkenness, the effects of which it increases or diminishes; now sobering one individual, and again rendering another even more violent.

Chronic alcoholism is a predisposing cause of injury. The drunkard has hallucinations and a tendency to suicide; he readily loses the sense of self-preservation, and commits, even when fasting, a host of extravagances. The keenness of his senses is diminished, as well as the promptness and precision of his protective and defensive acts. If hard drinking and drunkenness should disappear, we could dispense with one-third of the beds in our surgical wards. Chronic alcoholism profoundly modifies the reparative process, is singularly prejudicial to the healing of accidental or operative wounds, and greatly aggravates the prognosis of traumatism in general. In fact, every wound, although of itself of slight importance (contusions, subcutaneous fractures, punctures, excoriations), may be followed by death in drunkards. This termination is often due to complications starting from the wound, such as lymphangeitis, erysipelas, hemorrhage, diffuse phlegmon, gangrenous inflammation, or sphacelus, the whole accompanied or followed by grave traumatic fever or pyæmia, and the entire train of the adynamic and ataxic symptoms of severe blood-poisoning. These complications are the more alarming as the chemical composition and structure of the humors and tissues have been more profoundly modified by the alcohol, and as these disorders affect organs more essential to life, such as the brain, or those more directly concerned with

nutrition, such as the lungs, liver, and kidneys. They do not always cause swift death, and may even disappear quite rapidly; then the curative process, which has been temporarily suspended, resumes its course with more or less activity and rapidity; but it may also be subject to fresh periods of arrest, languish for an indefinite period, and even retrograde. We then observe profuse suppuration, the absence of secondary union, and the formation of atonic wounds and callous ulcers. After various alternations, recovery may finally occur, but it is at least as common to find fresh complications supervene, rendering the local lesions manifestly incurable, and leaving no other alternative than death from cachexia, or surgical interference of the most dangerous kind.

The danger of wounds in drunkards is none the less serious when it comes reciprocally from the action of the traumatism on alcoholism. It is not rare to find that a wound recalls, with more or less violence, the manifestations of alcoholism which is latent, or which has been long believed to have disappeared. In the first rank stands *Delirium Tremens*. This serious complication may arise suddenly, a few hours after the injury, and by a true reflex action upon the previously affected cerebral organ; or it may appear at later periods, when the septic poison originating in the wound and produced by the local complications has more or less poisoned the blood. Be that as it may, this delirium tremens of traumatic origin is of considerable gravity, and often resists all the measures which are directed against it. Delirium is not the only neuropathy which injury may produce or awaken in the victims of alcohol; there must also be noted, epileptiform convulsions, tetanic spasms, hyperæsthesia and anæsthesia, hallucinations, and other psychical disturbances.

The reaction of the traumatism upon the other viscera affected prior to the wound, though less sudden and violent, is none the less very threatening. On the part of the digestive tract appear vomiting, anorexia—sometimes complete—and the malnutrition which results therefrom. When the liver is cirrhotic or fatty, secondary hemorrhages are greatly to be dreaded, as are also albuminuria and uræmic phenomena when the kidneys are affected. In case of fatty degeneration of the heart, we must have in our minds the liability to residual overdistension (*asystolie*), which has been already several times observed in drunkards, and which explains the sudden or very rapid death sometimes observed in their cases. In other words, when we remember that alcohol produces three principal lesions, to wit, fatty degeneration and cirrhosis in the parenchymatous organs, and atheroma in the vessels; and that in inveterate drinkers all the tissues and organs are more or less deteriorated, and all the functions more or less compromised, we may understand that death may occur in several ways, and, in some manner, through all the more important organs.

To certain lesions, however, correspond certain disorders which destroy life by a constant mechanism.

In crushes of the limbs and compound fractures for instance, death occurs from acute septicæmia. The centre of traumatism rapidly becomes the site of an intense phlegmonous inflammation, which extends step by step, and soon involves the entire limb; the connective tissue is infiltrated with gas and putrid fluids; sphacelus at once attacks the contused parts, and cadaveric decomposition appears to commence before death. Surgical interference is almost useless; amputation and resection are unavailing. Antiseptic dressings applied immediately after the accident have saved some wounded alcoholics, but still permit the death of the larger number.

Morphinism.

In regard to morphinism, we possess but few records, and those unaccompanied with many details. Opium administered continuously, and in moderate doses, is rather favorable to the cure of wounds, and more than one surgeon has extolled its use in severe injuries. But, as in the case of alcohol, there is a great difference between use and abuse, and in the same way that there is an acute and a chronic alcoholism, there are also acute and chronic forms of poisoning by opium. The latter variety, which was formerly known only in the Orient, has in its turn invaded the Western world since the extensive employment of narcotics by subcutaneous injection. Chronic morphinism is the only variety with the effects of which upon the course of injuries we are somewhat acquainted. Thus at the locality of hypodermic injections have been noticed phlegmons, abscesses, and spots of gangrene; at the site of operative wounds, erysipelas, bronzed inflammation, orange-colored suppuration; in a word, complications which are very analogous to those observed in alcoholics, and in diabetic and albuminuric patients.

While waiting for carefully made autopsies to show the nature of the histological lesions produced by slow morphia poisoning, experimentation and clinical study enable us to compare morphinism to the constitutional conditions described above. In fact, by injecting toxic doses of morphia in animals, we produce albuminuria, glycosuria, and ocular lesions which are comparable to those caused by these two diseases; and furthermore, examination after death reveals intense congestion of the nerve centres, and of the liver and kidneys. Moreover, this albuminuria and this glycosuria have been already noticed in morphiomaniacs. Charcot, for his part, has observed the development of furious delirium in morphiomaniacs, and in a case of pneumonia this latter affection terminated in gangrene. It is easy to understand that opium-eaters should present at the seat of injury complications with which they might be affected at any point whatever, without its direct implication, and simply in consequence of the poisoning itself or of the visceral lesions which it produces.

We know nothing of the reciprocal influence which traumatism may exercise upon morphinism. We will merely mention as a fact which is interesting to surgeons, that the use of chloroform demands special precautions in individuals who habitually make excessive use of morphia. Though relaxation is usually produced in them with readiness, the narcosis may be prolonged for an extremely long time, and may be accompanied by a depression of temperature which, in some cases, has awakened well-founded apprehensions.

As a sequel to these remarks on morphinism, we should no doubt speak of the more or less analogous intoxications caused by belladonna, tobacco, haschish, and some other narcotic substances. But, unfortunately, we must for the present, in absence of the necessary information, leave blank a space which the future will certainly fill.

Saturnism or Lead-Poisoning.

Animal and vegetable matters do not alone possess the baleful privilege of poisoning the organism, and of giving rise, like general diseases, to permanent constitutional conditions; the metalloids and metals also have the same property. We are in the possession of valuable knowledge with regard to this class of poisonings, several of which have even received special names.

Thus we speak of *iodism*, *mercurialism*, and *saturnism*, and we shall soon speak of *phosphorism*, *arsenicism*, etc. The list will become very markedly extended as soon as shall be included in the pathology of artisans all the special morbid conditions produced by the constant employment of this or that toxic substance.

These poisons naturally bring into the chemical composition of our fluids, and into the histological constitution of our tissues and organs, modifications, some of which have already been well described. Naturally, also, these dyscrasiæ and these peripheral or visceral lesions, modify the reparative process in cases of wounds. Unfortunately, we can here only form conjectures and hypotheses, surgeons not having hitherto concerned themselves with the manner in which injuries act in individuals poisoned by phosphorus, arsenic, mercury, etc.

More anxious to mark a place for these investigations, than capable of illustrating the subject by my personal experience, I have made a short section on saturnism, as I have already collected some observations on wounds occurring in individuals suffering from lead-poisoning. In one, a contusion gave rise to a renewed attack of lead-colic; in another, an insignificant wound of the great toe was followed by lymphangeitis of rapid course; in a third, the onset of saturnism caused the reopening of a focus of suppuration which had been closed for ten years. Two amputations, one of the leg, the other of the arm, performed in patients of this class were not followed by any complications. No conclusions can be reached until we are in possession of a larger number of facts.

Hepatism; Nephrism; Cardism.

We have already laid down the principle that every old or serious lesion of an important viscus, whatever may be its origin and causes, produces, after a longer or shorter interval, a change, first in the chemical composition of the fluids, and then in the anatomical constitution of the solids; creating, in a word, a general morbid condition, imperfectly defined perhaps, but as dangerous to life as a well-determined disease. Such changes inevitably occur in patients suffering from affections of the liver, kidneys, heart, spleen, lungs, intestines, and doubtless also the brain. It is true that, in many of these individuals, the lesions of the liver, kidney, heart, etc., are neither primary nor isolated, and that they form part, on the contrary, of a pre-existing morbid entity—so that, for example, a patient suffering from hepatic disease is an alcoholic, one suffering from kidney disease is gouty, and one from heart disease rheumatic. Nevertheless, while taking the general disease into consideration, great interest attaches to an examination of the peculiar influence exerted upon it by the marked alteration of this or that viscus. In fact, constitutional diseases do not always implicate the same organs, and do not always affect them with the same intensity; not all rheumatics suffer from cardiac disease; not all alcoholics have a diseased liver; and a patient may be gouty though the kidneys are in good condition. Clinically there is room for investigating (1) what differences would be presented by three rheumatic patients, one of whom had a mitral lesion, a second biliary lithiasis, and the third albuminuria; and (2) the differences noticeable in three cases of hepatic disease, in which the causes of the lesions were alcoholism, syphilis, or prolonged suppuration of bone.

In the field of surgery these researches are no less important, experience having shown that injured persons are exposed to serious complications whenever one of the important viscera has been previously affected, and that

there are intimate relations between the nature of the complications and the lesion of this or that organ. I have thought it well to reproduce here some of the information which we possess on this subject. It is necessary, however, to remark that though the framework may be prepared, it cannot at this time be filled up. We possess somewhat precise information only in regard to those conditions which are produced by hepatic, by renal, and by cardiac affections; in the future, the series will undoubtedly be made complete.

Hepatism.—It is difficult to define this condition precisely, and to briefly indicate the general disturbances which characterize it, for the lesions of the liver are numerous; of very various kinds; often latent at the beginning, during their entire course, and even when they are in an advanced stage; and finally are manifested by a sufficiently complex set of symptoms. Nevertheless it is correct to say that they more especially affect the functions of the digestive and circulatory apparatus, and that they interfere with nutrition by the changes produced in the quantity and quality of the blood.

Each distinct hepatic lesion (chronic congestion, atrophic or hypertrophic cirrhosis, fatty or amyloid degeneration, syphiloma, lithiasis, biliary retention, cancer, cystic disease), evidently acts after its own manner and with more or less intensity upon nutrition, digestion, the peripheral or cardiac circulation, and the composition and genesis of the blood. But from the point of view which we occupy, that is to say as far as concerns the relations of affections of the liver to injuries, the differences are not as marked as might be believed. In fact, in autopsies upon individuals suffering from hepatic disease, who have succumbed from the results of their wounds, the most varied changes have been found: fatty degeneration, cirrhosis, old perihepatitis, amyloid degeneration, lithiasis, cancer, unrecognized hydatids, etc. Everything leads us to believe that when the number of cases shall be increased, less confused results will be obtained; but, at the present time, we are compelled to satisfy ourselves with merely referring to the influence of hepatic affections, taken all together, upon traumatism, and *vice versa*.

In the first place, we may declare, without fear of contradiction, that this influence is generally injurious; that every wound is serious in a patient suffering from hepatic disease; that every such patient is in danger, and that in case of such coincidence, the prognosis is rendered gloomy by each of the two factors in the morbid association. After this statement, if we reflect upon the extreme frequency of secondary changes in the liver; upon its almost inevitable implication by toxic agents such as alcohol, arsenic, and malarial and septic poisons; upon its implication sooner or later when the kidneys, spleen, or heart are chronically affected; upon its almost certain participation in all cachexiæ (tuberculous, cancerous, purulent, etc.); we shall understand what weight hepatism possesses in the question of surgical indications and contra-indications, and we shall wonder that a fact of such gravity should have for so long a time remained unrecognized.

The chief complications observed in these patients, at the region of the wound, are: inflammations of bad character; bronzed, erysipelatous, and diffuse phlegmons; sphacelus; wandering erysipelas, and, as a natural consequence of these local complications, grave traumatic fevers, septicæmia of an adynamic form, and pyæmia following a rapid course; secondary arterial, venous, or capillary hemorrhages are especially to be dreaded on account of their frequency and gravity, and the slight efficacy of ordinary hemostatic measures. The blood, moreover, does not flow through the wounded vessels only, but also escapes at a distance through the nasal and intestinal mucous membranes. Independently of these acute and serious accidents, we also find in these patients that the wound assumes a bad appearance, remains atonic

and languishing, furnishes an abundant but serous and fetid pus; that, in a word, it presents no tendency to cicatrization. I have several times observed this torpid process in the anal region, even when there was no tuberculous lesion present in the lung.

The wounds, however free they may themselves be from any unusual phenomena, may react directly upon the pre-existing hepatic affection, causing, for example, the reappearance of jaundice, biliary colic, anasarca, ascites, obstinate vomiting, and anorexia, profuse diarrhœa, etc. Under this disastrous influence, a patient with hepatic disease who yet has been in a passable condition and threatened by no immediate danger, may soon enter into the period of cachexia, and finally succumb at the end of a few weeks or months. But the disturbing action of the traumatism may be still more rapid and terrible. Thus we may find a patient who suffers from cancer of the liver, cirrhosis, or biliary lithiasis, sinking, shortly after an injury, into a vague condition, bearing no name, and without any well-defined symptoms, and die in a few days, precisely as those do who are wounded while suffering from albuminuria or diabetes.

The probabilities of the appearance of local complications, or of the reciprocal action of the injury upon the hepatic condition, can in no wise be determined from the nature or gravity of the injury. Life has been seriously threatened or even destroyed almost as often in consequence of slight injuries (leech bites, paracentesis abdominis, opening abscesses, simple fractures and dislocations), as after serious operations or grave wounds (compound fractures, severe contusions, herniotomy, castration, amputation, removal of tumors).

Nephrism.—This is the general condition observed in patients suffering from a grave renal affection, whether old or recent. This condition may be acute or chronic, temporary or prolonged, latent or revealed by more or less evident symptoms, among which the character of the urine occupies the chief rank.

The part played by the urinary secretion in the depuration of the blood enables us readily to understand and, to a certain extent, foresee, the changes undergone by the nutrient fluid when the renal parenchyma does not fulfil its eliminating function. Nephrism is very like cases of blood-poisoning, with this difference, that the poison here does not come from without but from within, manifesting its effects as soon as it accumulates in the mass of blood, and making an effort to escape through complementary channels. At the same time that they prevent the necessary expulsion of superfluous and injurious matters, certain renal lesions also permit the spoliation of the blood by the untoward escape of useful substances, as is the case, for example, in albuminuria. The blood, thus adulterated or impoverished, is ill-fitted for the nourishment of the tissues; the poison, seeking unusual channels of escape, affects the various organs, so that, at the end of a certain length of time, there is a true disease *totius substantiæ;* the digestive functions are lowered, the heart is affected, the peripheral circulation embarrassed; the blood escapes from its channels, and serum accumulates, especially in serous or connective tissue spaces. Finally, the nervous centres themselves participate in the disorder.

Renal affections, which are numerous, do not all produce nephrism with the same rapidity or intensity, but eventually, if persistent, they all end by ruining the organism. Generalized, interstitial or parenchymatous nephritis, hydronephrosis, and cystic degeneration, are especially grave; then follow renal lithiasis and pyelonephritis; and finally fatty and amyloid degeneration. From a surgical point of view, however, we may repeat what has been said above with regard to affections of the liver, that is that we are not in a position to say which form of nephritis, for example, most seriously complicates

injuries, and, in its turn, receives from them the most disastrous aggravation. We must restrict ourselves to the statement that the coincidence of an injury and a renal affection (even if but slightly serious) gives occasion for a very unfavorable prognosis.

The local complications of wounds in these cases are very similar to those which have been observed in patients suffering from hepatic diseases. Thus we note secondary hemorrhages, diffuse inflammations of the connective tissue or lymphatics, severe erysipelas, sphacelus, osteo-myelitis, pyæmia, and, as less serious complications, persistent œdema, extreme slowness of the reparative process, interminable serous suppuration, a puffy, bleeding, grayish appearance of the granulations, etc. The bad appearance of wounds is especially noticeable when they affect tissues which have been already infiltrated, as occurs in cases of albuminuria. To these unfavorable conditions of the traumatic centre are naturally superadded general phenomena, and especially more or less active fever, often accompanied by chills. Such symptoms must not always be attributed to the existence of pyæmia. In fact, the attack which makes us fear the invasion of this terrible complication may be simply of renal origin; that is to say, produced by the reaction of the injury upon the pre-existing disease of the kidneys. At the approach of death, it is not rare to find a very marked fall of temperature.

If local complications of wounds carry off a certain number of patients with renal disease who have been wounded or operated upon, death occurs perhaps still more frequently from the inverse action; that is to say, from the rapid or progressive aggravation produced by the traumatism in the pre-existing renal lesions. Among operations, we must particularly mention those performed on the urinary apparatus itself, such as lithotomy, lithotrity, and urethrotomy, and also the incisions rendered necessary by hemorrhagic or urinary infiltrations. If we suppose them to have been properly performed, and the after-treatment judiciously conducted, these operations are benign when the kidneys are sound or but slightly changed; but things are very different when any form of nephritis is present. The mortality then becomes considerable; those operated upon usually succumb in a few days with the general lesions which characterize the last stages of renal affections abandoned to themselves, to wit, diffuse inflammations, gangrene, serous effusion into the pleural and pericardial cavities, pulmonary œdema, and uræmic accidents, such as coma, dyspnœa, eclampsia, etc. Peripheral wounds and operations may also lead to rapid death, even though the seat of traumatism does not appear abnormal; but the progress of the complications is usually less violent; a latent albuminuria becomes evident or is aggravated; nephritis declares itself, with fever, dyspeptic disorders, vomiting, dryness of the tongue, etc.; anasarca appears or becomes more extensive. All may then do well; but it is not rare to find that the renal affection thus excited assumes a progressive course, and increases continually until it produces death, a longer or shorter period after the healing of the wound.

An injury has more than once given rise to the first appearance or sudden return of nephritic colic. Traumatisms affecting certain regions of the central nervous system have produced albuminuria and polyuria, usually, however, only temporary. Wounds of the kidneys themselves are serious when they give rise to oliguria, and especially to anuria; for these symptoms, though accidentally produced, imply a condition of the economy which is as serious as if they resulted from an old renal lesion. We shall not thoroughly understand the reciprocal influence of injuries and of nephrism until it shall have been demonstrated that all wounds modify the composition of the urine, that every modification of the urine implies a corresponding change

in the composition of the blood, and that this modification may in certain cases act upon the reparative process.

Cardism.—Even severe disturbances of the central circulation do not derange the course of the reparative process, if they are temporary. On the contrary, valvular lesions and degenerations of the muscular tissue of the heart may, by changing the static and dynamic conditions of the entire circulation, modify the chemical composition of the blood, cause impairment of important viscera like the liver or lungs, alter the connective tissue which is so necessary to cicatrization, and, in a word, create, locally as well as throughout the entire economy, conditions which are very unfavorable to the proper evolution of the process of cicatrization. Thus passive hemorrhages, either prolonged primary, or early or late secondary bleedings—difficult to check in all cases—have been observed in patients thus affected, together with considerable œdema of the wounded region, and, at the site of the swelling, patches of erythema, of erysipelas, and even of gangrene, such as are met with in all infiltrated tissues, whatever be the cause of the infiltration; and, finally, a local atony which readily metamorphoses the wound into an ulcer, and indefinitely delays cicatrization.

The reaction of the injury upon pre-existing cardiopathies, is still more serious, without reference to the grave, even fatal, attacks of syncope which may follow immediately upon the injury. It is very frequently found, in cases of fatty degeneration of the heart, that the circulation and respiration become embarrassed, and that the wounded person rapidly succumbs, without anything having foretold this termination, and when everything has appeared to be doing well. The catastrophe has been more than once attributed to the effect of chloroform, or to shock, though simply due to the sudden or slow stoppage of an already affected heart. In less severe cases, the traumatism merely reveals cardiopathies which had been hitherto misinterpreted or even ignored by the patients; intensifies the symptoms, especially the anasarca and serous suffusions; and increases the phenomena of oppression, of dyspnœa, by aggravating the secondary disturbances on the part of the lungs.

We possess but little information in regard to wounds in individuals suffering from *aneurisms of the aorta*. I nevertheless know of the rupture of an aneurismal sac (the existence of the blood-tumor not having been previously suspected) in consequence of the simple puncture of a hydrocele. Operations are often performed upon limbs affected by *arterial atheroma*, and it is said that secondary hemorrhage is to be apprehended in such cases. This assertion does not appear to be well demonstrated, and there is much more reason to fear gangrene, in cases of contused wound, or complete or partial sloughing of the flaps of an amputation. There is also danger of a complication which is perhaps even more grave; starting from the injured point, the vessels become inflamed, and an acute endarteritis descends towards the periphery and mounts to the endocardium, producing all those consequences which can readily be foreseen.

Locomotor Ataxia and Various Neuroses.

This disease, which affects the nutrition of certain tissues, chiefly the bones, predisposes on this account to fractures and to those peculiar atrophies of the epiphyses, the point of departure of which is sometimes found in external violence. Some facts also tend to prove that cicatrization progresses slowly or imperfectly in the wounds of ataxic patients.

The reciprocal influence of traumatism upon ataxia is better established.

In the first place, wounds which involve the spine directly and the spinal cord indirectly, readily give rise to chronic myelitis, the symptomatology of which is very like that of ataxia, in certain cases. It has been asserted that wounds affecting the limbs, that is to say at a distance from the spinal cord, may also give rise to ataxia. This is doubtful, and it is much more probable that the violence merely plays the part of an exciting cause giving rise to the premature appearance of the phenomena in predisposed subjects. At all events, there is no doubt that ataxia is usually exaggerated and aggravated by injuries, whether or not they affect the region of the spine. It has been held that certain operations favorably modify or even cure ataxia. But this is a mistake; this affection has been confounded with nervous disorders of reflex origin, which have been relieved by removing the point of peripheral departure. Injuries sometimes present, in neuropathic individuals, a defective evolution and numerous local complications; analgesia, hyperæsthesia, simple or hemorrhagic congestion, lesions of the granular membrane, delay in cicatrization, etc. As a result of wounds of nerves, and of limbs formerly affected by infantile or other forms of paralysis, superficial or deep ulcerations are found to occur, which are attributed to trophic disturbances, and which are at all events very painful and extremely difficult to heal, especially in winter. Reciprocally, in the same neuropathic patients, an injury may excite, revive, or exaggerate nervous manifestations which assume the strangest forms, and which attack the central and visceral nervous systems, as well as general motion and sensation.

Among defined neuroses, *hysteria* and *epilepsy* present close relations to traumatism. In addition to the fact that they sometimes seem to be directly due to injuries, affecting especially the genital apparatus in woman, and the brain in both sexes, it is certain that wounds of the most diverse character as regards situation and extent, have the power of exciting hysterical or epileptic attacks, often indeed with extreme violence. On the other hand, we find mention made by authors of more than one case of epilepsy cured by an accidental wound or by premeditated operation. There has been considerable discussion as to whether *insane* persons tolerate wounds better or worse than other individuals, and the most contradictory facts have been adduced in regard to the matter. The fact is that it is impossible to class together the subjects of mania and those of dementia; those who are excited, with the victims of general paralysis; those whose brains are affected by alcoholism and those affected by old wounds. With such a variety, it is neither possible nor useful to attempt a generalization; and a detailed investigation would not be in place in a work of this character.

Diabetes Mellitus.

All are agreed concerning the unfavorable course of wounds and the gravity of operations in diabetic patients. The reparative process is often absent, or at least very slow, and interrupted by numerous complications. In open wounds are noticed primary capillary hemorrhages, which are difficult to arrest, and also secondary hemorrhages; in contused wounds, diffuse inflammation, bronzed phlegmons, and extensive sloughing. Insignificant wounds such as punctures and excoriations, become inflamed and provoke lymphangeitis, erysipelas, and phlegmons which become complicated by gangrene *en masse* or in isolated patches, and the progress of which is with great difficulty arrested. Slight operations, followed by immediate union, have often presented similar complications. Even the moderate pressure of an apparatus has produced circumscribed gangrene of the skin. Subcutaneous wounds are

less serious, but fractures unite with great difficulty. Diabetic phlegmon and gangrene sometimes progress slowly and without provoking any very violent or grave general symptoms, but they none the less terminate in death, in the majority of cases, especially in old persons whose internal organs are in a bad condition, and when suitable treatment has not been employed in time. Traumatism affecting the region of the medulla oblongata, either directly or indirectly, may, as is well known, produce glycosuria which is usually of short duration, and which undergoes spontaneous cure.

Wounds affecting a diabetic subject generally aggravate his condition. The sugar, which had disappeared, shows itself again, or becomes more abundant. This is especially observed in operations upon those who have been previously recognized as diabetic, and in whom the sugar has been made to disappear from the urine. This return of glycosuria may be temporary, but it may also hasten the development and natural termination of the disease. Wounded diabetics may recover, but they may die in several ways; in the first place, from inflammatory or septic complications which have started in the wound; then of complications on the part of the brain, heart, or lungs; and finally they may rapidly die in a sort of adynamic condition which we cannot attribute to any well-defined local or general complications. The gravity of the prognosis is greater as the wound or operation is more serious, as the quantity of sugar is larger, and as the diabetes is accompanied with more advanced visceral lesions.

The distinction established by modern writers between glycosuria and diabetes is admissible to a certain extent, but we must not trust to it too much, and regard as benign those wounds which occur in individuals who pass but little sugar. It is equally incorrect to regard as favorable the substitution of albumen for sugar in certain diabetics. Except in urgent cases, we should never operate upon a diabetic patient, until we have made the sugar disappear as much as possible from the urine.

Alcohol-diabetes.—Although it has not yet been referred to, the association of alcoholism and diabetes cannot be very rare, if we take into account, on the one hand, the polydypsia natural to diabetics, and, on the other, the advice given these patients to take stimulating drinks. As poisoning by alcohol and poisoning by sugar both give rise to quite similar complications in the traumatic centre—diffuse inflammation, erysipelas, gangrene—it is not surprising to find that in the subjects of alcohol-diabetes, wounds, which were at first slight, are followed by serious and rapid complications. Thus, I have seen a puncture or contusion cause very extensive sloughing, and catheterization give rise to double, rapidly fatal nephritis. While an autopsy often gives negative results in cases of simple diabetes, in those cases of alcohol-diabetes which I have seen, grave visceral lesions have been noted—cirrhosis, old perinephritis, double nephritis—which were very probably the results of the alcoholism, and which would by themselves have given rise to the fatal termination without the concurrence of the diabetes. More numerous observations will permit further study of this interesting variety of hybrid disease.

Phosphaturia.

Glycosuria is not the only form of diabetes; in the same rank must be placed simple polyuria, or diabetes insipidus; phosphaturia, or phosphatic diabetes; azoturia, and finally uric diabetes, which alternates so frequently with diabetes mellitus. Who knows indeed whether the list will not become more extensive, and whether it will not be necessary, at some future period,

to add the exaggerated elimination of the chlorides, or of any other substances contained in the urine? For the present, I have but little to say in regard to the relations existing between injuries and these various forms of diabetes. In a very large and stout man a slight contused wound of the leg did not heal, and tended to become transformed into an ulcer. Examination of the urine showed that the patient was azoturic to a high degree. On the other hand, a young scrofulous individual passed daily from 12 to 15 litres [12½ to 16 quarts] of urine as clear as water. Disarticulation of the first metatarsal bone had to be performed; it was followed by no complication, and the wound healed without delay or difficulty.

I have collated more abundant and more interesting material with regard to phosphaturia. It has, in the first place, appeared to me to play an important part in fragilitas ossium, and in the spontaneous fractures which occur without previous circumscribed lesions. Certain facts would permit us even to establish relationships between organic affections of the bones and phosphaturia, although it is impossible to decide whether the latter be cause or effect. We will often find an exaggerated elimination of phosphates in cases of polyuria in scrofulous children suffering from osteitis. I have several times observed the disastrous influence exercised by phosphaturia upon the local progress of injuries. I have noted, for example, a consecutive hemorrhage, a diffuse phlegmon, orange-colored suppuration, purulent destruction of the eye after the operation for cataract, marked delay in the union of fractures, etc.

As a sequel to well-characterized maladies, it would be proper to study, in their relations to accidental or surgical injuries, certain temporary states which assuredly are not pathological in the literal sense of the word, and yet during the duration of which, the organism finds itself under peculiar conditions. These states include *dentition*, *puberty*, *menstruation*, *the menopause*, *pregnancy*, *the puerperal state*, and *lactation*. In the opinion of the public, these conditions have a very manifest influence upon previously existing or intercurrent diseases, and it would be very useful to know exactly whether it were the same in regard to wounds. The question of surgical interference, also, arises very frequently in the two extreme periods of life, *infancy* and *old age*. Opinions differ widely as to the course of injuries and the manner in which they are tolerated under these circumstances. Unfortunately we have not sufficient materials to clear up all these problems; we barely possess a few facts in regard to pregnancy and the puerperal state, and to operations in childhood and old age. I give here a brief summary of what is known to science upon these subjects.

Pregnancy.

This question was debated at length in the International Congress of Geneva, in 1877. It was established that pregnancy and traumatism may run their course parallel to each other in a normal manner, without influencing each other in the slightest degree, even when the injuries are extremely severe; that pregnancy may disturb the reparative process by delaying or hindering healing, and by giving rise to various wound-complications at the injured point; it may also aggravate certain non-traumatic affections in such a manner as to render necessary and even urgent, operations which, in the non-pregnant condition, could have been avoided or postponed. The delay or hindrance in the healing of wounds, which is produced by pregnancy, may cease immediately after delivery, which restores to the reparative tendency all its power.

Accidental or operative wounds, even the slightest, may interfere with

gestation in several ways: by provoking abortion or premature delivery; by causing the death of the mother with or without that of the child, and either before or after that of the child.

The normal termination of the pregnancy, that is to say the reciprocal independence of the traumatism and of the pregnancy, may be foreseen and announced: when the wound is remote from the genital apparatus; when it affects healthy tissues; when it is slight, simple, and not complicated primarily or consecutively by any accident capable of transforming the wounded person into a sick one; and when, on the other hand, the uterus, the fœtus, and its annexes, are anatomically and physiologically normal, and when the maternal organism, which has been suddenly subjected to the injury, is sound or nearly so, that is to say free from all constitutional disease existing either before or after fecundation, and when it remains so afterwards.

The injurious influence of traumatism upon pregnancy and the various terminations which follow, may, in turn, be foreseen and declared: when the wound affects the fœtus and its annexes, the uterus, and the other organs pertaining to the genital sphere, and when these parts are, in advance, altered in various ways; when the wound is extensive or grave in itself, or when it affects organs essential to the life of the mother; when the mother has suffered, before the reception of the wound, from a constitutional morbid condition, or from a circumscribed affection which renders abortion possible and probable; or when some complication starts from the wound or its immediate neighborhood, and is at all events capable of weakening, shattering, or poisoning the maternal or fœtal organisms.

We may hope for and declare the favorable, though indirect, action of surgical traumatism upon pregnancy, when, by the aid of even a serious operation, we can succeed in removing an affection which is still more dangerous to mother and child.

The aggravation of certain morbid conditions in the pregnant woman is explained by the general or local modifications which pregnancy produces in the circulation, in nutrition, in the composition of the blood, and in the genesis of anatomical elements; and in the same manner is explained the favorable action of delivery, which suppresses various pathogenetic causes. We can understand the hurtful effect of the puerperal condition upon traumatism contracted after delivery, if we take into consideration the conditions then presented by the injuries which, in fact, often involve tissues that are altered, or profoundly modified in their structure and properties; individuals already wounded by the mere fact of the uterine trauma; women already sick in consequence of pregnancy itself or of the constitutional conditions which may be associated with it. Whenever a woman, during the period of fecundity, is wounded accidentally or as the result of a surgical operation, we should always determine whether she is in a condition of pregnancy or not. In the former event, we should note with extreme care, immediately after the injury or before the operation, the organic conditions of the mother, the state of her genital apparatus, and that of the product of conception. In case of an accidental injury, the local and general treatment should be directed to moderating or preventing the direct or indirect, disastrous effects of the wound upon the genital apparatus; to maintaining the patient in, or restoring her to, the condition of one who is simply wounded, and to prevent her from being changed into one who is sick; to palliating or combating every injurious effect of pregnancy upon the reparative process; in a word, to preventing abortion.

When abortion occurs, we should watch the wound to ward off any possible aggravation, and the uterus to prevent the septicæmia of which it is sometimes the starting-point and the seat.

Surgical interference is not interdicted during pregnancy, but is subject to special rules. We should operate upon a pregnant woman with the greatest reserve, and sometimes refuse absolutely; but it would be an equally grave fault to abstain systematically in all cases. The affections which are amenable to operation—more numerous during gestation than during the non-pregnant state—are divided into several categories which suggest the following rules of practice:—

To operate at once in those affections which immediately endanger the life of the mother, and against which medical treatment would be certainly or almost certainly unavailing;

To operate also, at a suitable time, and after having tried palliative or curative remedies, in those diseases which, although not immediately compromising life, endanger it by their progress, and tend to become incurable if not met with energetic treatment;

To operate also in those affections which, without disturbing pregnancy and without being aggravated by it, become, at its termination, causes of dystocia. In these cases, the surgeon may operate before or at the very period of delivery, upon the mother or upon the fœtus, the premature expulsion of which may be induced. An attempt should be made to save both the maternal and fœtal lives, but, if this be impossible, the latter must be unhesitatingly sacrificed to the former;

To abstain, as far as possible, in those affections which are uninfluenced by pregnancy—and which, in turn, only compromise pregnancy and parturition indirectly—by, as far as possible, allowing nature to act, and by aiding her by mild measures;

To abstain absolutely from every operation for affections which compromise only the form or function of organs of secondary importance, or which are susceptible of spontaneous cure after delivery;

To avoid, as far as possible, every operation during the puerperal state. In case of danger, to operate rather during pregnancy, and, under opposite circumstances, to postpone interference until a period sufficiently remote (two to four months) from delivery.

Infancy.

The benignity of wounds and surgical operations in children is universally admitted, and the explanation, moreover, is simple. In fact, at this period of life, constitutional diseases are not deeply rooted, but of recent date; the viscera are for the most part healthy; and connective-tissue proliferation and regeneration of tissues occur with promptness and energy, etc. We must not, however, regard this benignity as a rule without exceptions. Athrepsic children, poorly nourished, syphilitic, or tubercular, or who suffer from calculus with nephritis, readily fall a prey to the consequences of their wounds.

In this long period of childhood, moreover, we should establish categories according to the age, and consider also the particular variety of operation which is in question. The new-born, for example, support loss of blood and restricted diet very badly; and the resulting contra-indications continue at least until the twelfth or fifteenth month. It is for this latter reason that we postpone until the fourth or fifth year, if not later, complicated operations upon the mouth, lips, hard or soft palate, etc. The small size of the parts also relegates to the period of late childhood certain anaplastic operations upon the penis and fingers. Finally, we wait still longer before undertaking the cure of certain imperforations in the female sex.

Old Age.

Some old people, whom we should rather call aged than old, tolerate traumatic lesions as well as adults. In others, on the contrary, the reparative process remains imperfect. Interstitial wounds suppurate; immediate union fails; local inflammations do not remain circumscribed; gangrene attacks the detached and thinned integument; simple fractures unite slowly; severe contusions are complicated by diffuse phlegmon and sloughing. At other times, the seat of traumatism remains indolent, without tone, and languishing; but threatening internal inflammations are set up; pneumonia, nephritis, meningo-encephalitis declare themselves, followed by their train of general adynamic or ataxic symptoms, and death promptly ensues. The autopsy almost always reveals a previously existing bad condition of the great viscera, which entails the same consequences as in adults. In individuals who are apparently healthy despite advanced age, the organs have sufficed for the needs of a regulated and tranquil life; the traumatism occurs, gives a shock to the economy, stirs up old morbid susceptibilities, and destroys an organization which has only maintained itself in equilibrium, as it were, by accident.